# PATENT ABSTRACTS OF JAPAN

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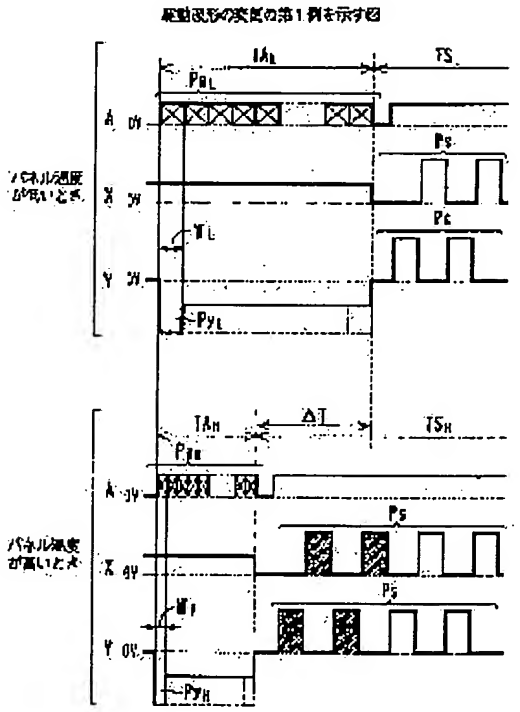
## (54) DRIVING METHOD OF PLASMA DISPLAY PANEL

(57)Abstract:
PROBLEM TO BE SOLVED: To realize a high quality and stable display by effectively using a frame interval.
SOLUTION: Temperature of the panel surface corresponding to a cell is measured and pulse widths W of driving voltage pulses Py and Pa are varied in accordance with the temperature variation. When the measured temperature is relatively low, a pulse width WL is made longer. When the measured temperature is high, a pulse width WH is made shorter.



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CLAIMS

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[Claim(s)]
[Claim 1] Addressing which impresses an address pulse to the selection cel of the cel groups which are synchronized with the line selection by impression of a scanning pulse, and constitute the screen, The burning maintenance which impresses periodically the pulse for making said cel group produce display discharge is repeated. It is the actuation approach of a plasma display panel that it performs a gradation display. The panel skin temperature corresponding to at least one cel is measured. About said scanning pulse and address pulse The actuation approach of the plasma display panel characterized by changing pulse width and an impression period according to measurement temperature so that it may become short compared with the case where it is low when measurement temperature is higher than laying temperature.
[Claim 2] The actuation approach of the plasma display panel according to claim 1 which makes a change of the pulse width according to measurement temperature, and an impression period to more than a three-stage.
[Claim 3] It is the actuation approach of the plasma display panel according to claim 1 which stops substantially impression of as opposed to [ set the die length of the period from initiation of burning maintenance to termination constant irrespective of temperature, and ] said cel group in the period of the arbitration of a before [ from termination of burning maintenance / initiation of subsequent addressing ] of an electrical potential difference.
[Claim 4] The actuation approach of the plasma display panel according to claim 1 which makes [ more ] the count of a repeat of addressing per frame, and burning maintenance than a count when measurement temperature is lower than said laying temperature when measurement temperature is higher than said laying temperature.
[Claim 5] The actuation approach of the plasma display panel according to claim 1 which makes [ more ] the count of the display discharge per frame than a count when measurement temperature is lower than said laying temperature when measurement temperature is higher than said laying temperature.
[Claim 6] The actuation approach of the plasma display panel according to claim 1 which makes longer than time amount when measurement temperature is lower than said laying temperature time amount assigned to initialization of wall charge performed in advance of addressing when measurement temperature is higher than said laying temperature.
[Claim 7] Initialization which impresses the pulse for making the cel group which constitutes the screen produce reset discharge, Addressing which impresses the pulse for making the selection cel of said cel groups produce address discharge, It is the actuation approach of the plasma display panel which repeats the burning maintenance which impresses the pulse for making said cel group produce display discharge. The pulse width of the pulse for measuring the panel skin temperature

corresponding to at least one cel, and producing reset discharge The actuation approach of the plasma display panel characterized by changing according to measurement temperature so that it may become short compared with the case where it is low when measurement temperature is higher than laying temperature.

[Claim 8] Initialization which impresses the pulse for making the cel group which constitutes the screen produce reset discharge, Addressing which impresses the pulse for making the selection cel of said cel groups produce address discharge, It is the actuation approach of the plasma display panel which repeats the burning maintenance which impresses the pulse for making said cel group produce display discharge. The pulse width and the impression period of a pulse for measuring the panel skin temperature corresponding to at least one cel, and producing display discharge The actuation approach of the plasma display panel characterized by changing according to measurement temperature so that it may become short compared with the case where it is low when measurement temperature is higher than laying temperature.

[Claim 9] Initialization which impresses the pulse for making the cel group which constitutes the screen produce reset discharge, Addressing which impresses the pulse for making the selection cel of said cel groups produce address discharge, It is the actuation approach of the plasma display panel which repeats the burning maintenance which impresses the pulse for making said cel group produce display discharge. The panel skin temperature corresponding to at least one cel is measured. When measurement temperature is higher than said laying temperature The actuation approach of the plasma display panel characterized by making [ more ] the count of a repeat of initialization and addressing per frame, and burning maintenance than a count when measurement temperature is lower than said laying temperature.

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## DETAILED DESCRIPTION

[Detailed Description of the Invention] This invention relates to the actuation approach of a plasma display panel (PDP).

[0001] PDP is a digital display device which consists of a binary luminescence cel, and since it is suitable for the display of digital data, it attracts attention as a multimedia monitor. Development of the brighter actuation approach which can display many gradation is furthered towards application amplification of PDP.

[0002]

[Description of the Prior Art] In the display by PDP of AC mold, addressing which makes the wall charge of optimum dose exist only in the cel which should light up of the cels by which the matrix array was carried out is performed, and burning maintenance which produces display discharge of the count according to brightness after that using wall charge is performed. Also in which of addressing and burning maintenance, it is necessary to make pulse width of the pulse to impress longer than a discharge time delay (time amount of the first transition of a pulse to a discharge-starting event). A discharge time delay becomes long, so that a discharge time delay has low temperature depending on environmental temperature.

[0003] In the former, pulse width was set up on the basis of the lower limit (for example, 0 degree C) of the operating temperature limit in a specification. That is, pulse width was selected by the value long enough so that desired discharge might arise also under minimum-temperature conditions.

[0004]

[Problem(s) to be Solved by the Invention] The period which can be assigned for the display discharge of the frame periods becomes short as resolution becomes large, since the duration of addressing is proportional to the line count (vertical resolution) of the screen. Moreover, the number of the frame division for a gradation display which can be divided becomes small. It is desirable the increase of a count and to carry out, and to raise brightness, or to shorten [ of display discharge ] the duration of addressing as much as possible, when carrying out and raising gradation nature, the increase of the frame number of partitions and.

[0005] By the conventional actuation approach, in actuation at the general environmental temperature and the temperature beyond it which are near the center of an operating temperature limit, pulse width was long beyond the need and a raise in brightness and many gradation-ization were restricted by it. Moreover, since the period which performs addressing was long, there was also a problem that the probability for discharge to arise in a non-choosing line was large.

[0006] This invention aims at realizing the display by which high definition was stabilized, using a frame period effectively.

[0007]

[Means for Solving the Problem] In this invention, the pulse width of a driver voltage pulse is changed according to the temperature change on the front face of a panel corresponding to a cel.

When panel skin temperature is low in comparison, pulse width is lengthened, and pulse width is shortened when temperature is high. For example, an operating temperature limit is carried out for 2 minutes, and pulse width is switched by which value of the low temperature range whose panel skin temperature is below a threshold, and the pyrosphere exceeding a threshold it is. If the threshold of two or more pieces is set up and a multistage story is switched, pulse width can be optimized more to a precision. It is also possible to make a temperature change follow and to change pulse width continuously. A change of pulse width can be made also about the pulse of which process of addressing, burning maintenance, and preparation (initialization of a charge) of addressing.
[0008] The period assigned to impression of the pulse can be shortened by shortening pulse width. For example, if the width of face of the pulse for the line selection in addressing is shortened, time amount compaction of the shortened line count twice of each pulse width is possible about 1 time of addressing. When the maximum time delay of the address discharge in 0 degree C is 2.0 microseconds and the maximum time delay in 25 degrees C is 1.0 microseconds, specifically, a shortened part per one pulse is set to 1.0 microseconds. In PDP of the VGA specification of a line count 480, if one frame shall be divided into ten subframes and a gradation display shall be performed, the sum total of abbreviated time will be set to 4.8ms (=1.0microsecondx480x10). This value is about 28.7% of a frame period (about 16.7ms). In addition, when dividing into two or more subfields the field which constitutes a frame in the display of an interlace format, time amount compaction is possible similarly.

[0009] If shortened time amount is assigned to burning maintenance, the count of display discharge can be increased and brightness can be raised. Width of face of the pulse in burning maintenance may be lengthened, and the soundness of display discharge may be raised. If the number of subframes is increased, diversification of an illuminant cloth effective in the improvement in gradation nature and prevention of false coutour can be attained. If it assigns preparation of addressing, more positive initialization processing can be performed. Moreover, since the period which is in a half-selection condition becomes short when addressing is shortened, discharge can be prevented and an indication can be given to stability. Furthermore, also by establishing the period which stops impression of an electrical potential difference, and calming down the charge of discharge space, discharge can be prevented and an indication can be given to stability.
[0010]
[Embodiment of the Invention] [Outline of an equipment configuration and actuation] Drawing 1 R> 1 is the block diagram of the display concerning this invention. The display 100 consists of a drive unit 70 which controls PDP1 of a field discharge mold with the possible screen of the color display which consists of a cel of a mxn individual, and luminescence of a cel, and a sensor 90 which detects panel skin temperature. The controller 71 built into the drive unit 70 changes the pulse width of the driver voltage pulse impressed to a cel according to the output of a sensor 90. In addition, impression of a pulse means carrying out bias of the electrode to predetermined potential temporarily.
[0011] In order to produce desired discharge in all cels, pulse width must be made longer than the discharge time delay in a cel with the lowest temperature. Therefore, the monitor of the temperature by the sensor 90 is performed about the part to which temperature tends to become low like a comparison of the screens. Although it is desirable to measure directly the temperature inside the cel concerning discharge properties, such as electronic ionic temperature, skin temperature of the MgO film, and temperature of a fluorescent substance, a sensor 90 may be arranged in the location distant from the cel, and temperature may be measured indirectly. It is also possible to presume the temperature of a cel based on the function of tooth-back chassis temperature, actuation circuit element temperature, the time amount from powering on, and a display load factor and time amount. Since it is dependent on the content of a display, the cel to turn on may concentrate on a part of screen, and may

carry out temperature up of the temperature distribution of the screen locally. The dependability of measurement increases by measuring the temperature of two or more places.

[0012] Drawing 2 is drawing showing the electrode array of PDP. In PDP1, the display electrodes X and Y which constitute the electrode pair for producing display discharge are arranged by parallel, and the address electrode A is arranged so that these display electrodes X and Y may be intersected. The display electrodes X and Y were prolonged in the line writing direction (horizontal direction) of a matrix display, and the address electrode is prolonged in the direction of a train (perpendicular direction). In drawing, the subscript of the reference mark of the display electrodes X and Y and the address electrode A shows array ranking. The potential of the display electrodes X and Y is controlled by the X driver 74 and the Y driver 77, and the potential of the address electrode A is controlled by the A driver 80.

[0013] Drawing 3 is drawing showing the cellular structure of PDP. PDP1 consists of substrate structures (structure which prepared the component of a cel on the substrate) 10 and 20 of a couple. Each of the display electrodes X and Y arranged by the inner surface of the glass substrate 11 by the side of a front face consists of transparence electric conduction film 41 which forms a field discharging gap, and a metal membrane (bus electrode) 42 prolonged covering the overall length of a line. A dielectric layer 17 is formed so that the display electrode pair X and Y may be covered, and the magnesia (MgO) is put on the front face of a dielectric layer 17 as a protective coat 18. One address electrode A is arranged by the inner surface of the glass substrate 21 by the side of a tooth back at each one train, and two or more plane view band-like septa 29 are formed on the dielectric layer 24 which covers these address electrode A. Discharge space is divided by the line writing direction for every train by these septa 29. And the fluorescent substance layers 28R, 28G, and 28B of three colors of R, G, and B for color display are formed so that the side face of the address electrode A and a septum 29 may be covered. The italic alphabet R, G, and B in drawing shows the luminescent color of a fluorescent substance. The fluorescent substance layers 28R, 28G, and 28B are locally excited by the ultraviolet rays which discharge gas releases, and emit light by them.

[0014] Drawing 4 is the conceptual diagram of field partition. In the display of the television image by PDP1, in order for selection of the combination of burning / astigmatism LGT to perform a color rendering, the field f of the time series which is an input image is divided into the subfield sf of a predetermined number q. That is, each field f is transposed to the set of q subfields sf. They are the weight U1 of brightness, U2, U3, --Uq to order in these subfields sf. It gives and the count of display discharge of each subfield sf is set up. You may be other sequence although a subfield array is the order of weight by a diagram. To compensate for such a field configuration, the field period Tf which is a field transfer period is divided at q subfield periods Tsf, and one subfield period Tsf is assigned to each subfield SF. Furthermore, the subfield period Tsf is divided into the display period TS for the address period TA for the reset period TR for initialization, and addressing, and burning maintenance. The die length of the display period TS is so long that weight is large to the die length of the reset period TR and the address period TA not being dependent on weight. Therefore, the die length of the subfield period Tsf is also so long that the weight of the corresponding subfield sf is large.

[0015] Drawing 5 is the electrical-potential-difference wave form chart showing the outline of an actuation sequence. The sequence of reset period TR, address period TA, and the display period TS is common in q subfields sf, and an actuation sequence is repeated for every subfield. In addition, about a wave, it is possible to change various the amplitude, polarities, and timing. Not only a write-in address format of a graphic display but elimination address format may be adopted.

[0016] In the reset period TR, the pulse Pry1 of straight polarity and the pulse Pry2 of negative polarity are impressed in order to all the display electrodes Y. The pulse Prx of negative polarity is impressed to impression and coincidence of a pulse Pry1 to all the display electrodes X, and bias of

the display electrode X is carried out to the potential of straight polarity after that. The synthetic electrical potential difference adding the amplitude of the pulse impressed to the display electrodes X and Y joins a cel. A pulse Pry1 is impressed in order to make all cels produce the suitable wall voltage of the same polarity irrespective of burning / astigmatism LGT in a before subfield. By impressing a pulse Pry2 to the cel in which moderate wall charge exists, wall voltage can be adjusted to the value equivalent to the difference of breakdown voltage and pulse amplitude. The electric-field condition in all cels is made for initialization (equalization of a charge) in this example to become the same at the time of address electrical-potential-difference impression.

[0017] In the address period TA, required wall charge is formed in burning maintenance only at the cel which should be turned on. Where bias of all the display electrodes X and all the display electrodes Y is carried out to predetermined potential, the scanning pulse Py of negative polarity is impressed to one display electrode Y corresponding to a selection line at every line selection period (scan period). The address pulse Pa is impressed to the address electrode A corresponding to the selection cel which should make the line selection and coincidence by impression of the scanning pulse Py produce address discharge. In a selection cel, discharge between the display electrode Y and the address electrode A arises, it serves as a trigger and display inter-electrode field discharge arises. Discharge of these single strings is address discharge. Wall charge is formed in a dielectric layer 17 of address discharge, and wall voltage required for burning maintenance arises in display inter-electrode by it.

[0018] In the display period TS, the sustain pulse Ps1 of straight polarity is impressed by turns to the display electrode Y and the display electrode X. By the first impression to the display electrode Y, display inter-electrode field discharge arises [ a cel electrical potential difference ] exceeding breakdown voltage in a selection cel. Since the polar wall charge of before and objection is formed of field discharge, in a selection cel, field discharge arises again by impression of the sustain pulse Ps to the display electrode X. Similarly, field discharge arises in a selection cel for every impression of the sustain pulse Ps henceforth. In the display period TS, in order to prevent unnecessary discharge, bias of the address electrode A is carried out to the potential of the sustain pulse Ps and like-pole nature.

[0019] In such an actuation sequence, the pulse width of the pulse impressed since discharge is produced is changed to compensate for panel skin temperature change.

[Change of pulse width] Drawing 6 is drawing showing the 1st example of modification of an actuation wave. In the 1st example, about the pulse width of the address pulse Pa, two steps of changes are performed and the count of impression of the sustain pulse Ps is changed according to the change in the address period TA by it.

[0020] When panel skin temperature is lower than the threshold set up beforehand, it is pulse width WL. Scanning pulse PyL long in comparison And address pulse PaL It impresses. Address period TAL Die length is pulse width WL. It becomes n or more times (n is a line count). In drawing, it is the scanning pulse PyL for convenience. An impression period is pulse width WL. It is carried out.

[0021] On the other hand, when panel skin temperature is high, it is pulse width WH. Scanning pulse PyH short in comparison And address pulse PaH It impresses. Address period TAH Die length is the address period TAL when temperature is low. It compares and only deltaT [=(WL-WH) xn] is short. By assigning this compaction part deltaT to burning maintenance, it is the sustain period TSH. Sustain period TSL when temperature is low It is long. Only the part which became long can impress more sustain pulses Ps, and can raise brightness. The sustain pulse Ps which attached the slash all over drawing is an added part.

[0022] Drawing 7 is drawing showing the 2nd example of modification of an actuation wave. In the 2nd example, the die length (deltaT) of the blank period in the stage of arbitration until it performs two steps of changes and starts addressing of the next subfield from termination of burning

maintenance according to the change in the address period TA by it about the pulse width of the address pulse Pa is changed. That is, the initiation stage of the sustain period TS is made adjustable, and when panel skin temperature is high, it is the address period TAH. The time amount from termination of the continuing sustain period TS to lengthen to initiation of the reset period TR of the following subframe is covered, and the display electrodes X and Y and the address electrode A are maintained at touch-down potential. However, the bias potential of each electrode can be selected in the range without fear of discharge that what is necessary is just to stop the electrical-potential-difference impression to a cel substantially. If a blank period is lengthened when panel temperature is high, it will be hard coming to generate the discharge after space charge becomes calm. Moreover, the die length of the reset period TR may be changed according to the change in the address period TA. According to this, when panel temperature is high, it becomes possible to perform more positive initialization processing.

[0023] Drawing 8 is drawing showing the 3rd example of modification of an actuation wave. In the 3rd example, two steps of changes are performed about the pulse width of the pulses Prx, Pry1, and Pry2 for initialization. When panel skin temperature is low, they are pulse width W1L and W2L. Pulse PrxL and Pry1L long in comparison, and Pry2L It impresses. When panel skin temperature is high, it is pulse width W1H and W2H. The pulse PrxH short in comparison, Pry1H, and Pry2H It impresses. And the shortened time amount by this is used effectively. That is, it assigns burning maintenance, and it carries out, and brightness is raised or discharge is prevented [ and ] the increase of the number of subfields, and by considering as a blank period. [ raising image quality ]

[0024] Drawing 9 is drawing showing the 4th example of modification of an actuation wave. In the 4th example, two steps of changes are performed about the pulse width of the sustain pulse Ps. When panel skin temperature is low, it is pulse width WsL. Sustain pulse PsL long in comparison It impresses. When panel skin temperature is high, it is pulse width WsH. The sustain pulse PsH short in comparison is impressed. Pulse width WsH Since it is short, they are many sustain pulses PsH from the time that it is low when panel skin temperature is high. It can impress and brightness can be raised. The number of subfields can be increased and image quality can also be raised. Shortened time amount can be assigned at the reset period TR, high initialization processing of soundness can be performed, and addressing and the electrical-potential-difference margin of burning maintenance can also be extended by it.

[0025] the above the 1- modification of the pulse width in each 4th example was two steps of modification which carries out an operating temperature limit bordering on a threshold Tth like drawing 10 (A) for 2 minutes, and switches pulse width by which value of the low temperature range whose panel skin temperature is below a threshold, and the pyrosphere exceeding a threshold it is. If the thresholds Tth1 and Tth2 of two or more pieces are set up like drawing 10 (B) and a multistage story is switched, pulse width can be optimized more to a precision. Furthermore, it is also possible to make a temperature change follow like drawing 10 (C), and to change pulse width continuously. It is decided by the temperature dependence of a discharge property whether to use a flattery property as a non-line type, or consider as a line type.

[0026]

[Effect of the Invention] According to invention of claim 1 thru/or claim 9, the display by which high definition was stabilized, using a frame period effectively is realizable.

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PRIOR ART

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[Description of the Prior Art] In the display by PDP of AC mold, addressing which makes the wall charge of optimum dose exist only in the cel which should light up of the cels by which the matrix array was carried out is performed, and burning maintenance which produces display discharge of the count according to brightness after that using wall charge is performed. Also in which of addressing and burning maintenance, it is necessary to make pulse width of the pulse to impress longer than a discharge time delay (time amount of the first transition of a pulse to a discharge-starting event). A discharge time delay becomes long, so that a discharge time delay has low temperature depending on environmental temperature.
[0003] In the former, pulse width was set up on the basis of the lower limit (for example, 0 degree C) of the operating temperature limit in a specification. That is, pulse width was selected by the value long enough so that desired discharge might arise also under minimum-temperature conditions.

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EFFECT OF THE INVENTION

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[Effect of the Invention] According to invention of claim 1 thru/or claim 9, the display by which high definition was stabilized, using a frame period effectively is realizable.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] The period which can be assigned for the display discharge of the frame periods becomes short as resolution becomes large, since the duration of addressing is proportional to the line count (vertical resolution) of the screen. Moreover, the number of the frame division for a gradation display which can be divided becomes small. It is desirable the increase of a count and to carry out, and to raise brightness, or to shorten [ of display discharge ] the duration of addressing as much as possible, when carrying out and raising gradation nature, the increase of the frame number of partitions and.
[0005] By the conventional actuation approach, in actuation at the general environmental temperature and the temperature beyond it which are near the center of an operating temperature limit, pulse width was long beyond the need and a raise in brightness and many gradation-ization were restricted by it. Moreover, since the period which performs addressing was long, there was also a problem that the probability for discharge to arise in a non-choosing line was large.
[0006] This invention aims at realizing the display by which high definition was stabilized, using a frame period effectively.

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MEANS

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[Means for Solving the Problem] In this invention, the pulse width of a driver voltage pulse is changed according to the temperature change on the front face of a panel corresponding to a cel. When panel skin temperature is low in comparison, pulse width is lengthened, and pulse width is shortened when temperature is high. For example, an operating temperature limit is carried out for 2 minutes, and pulse width is switched by which value of the low temperature range whose panel skin temperature is below a threshold, and the pyrosphere exceeding a threshold it is. If the threshold of two or more pieces is set up and a multistage story is switched, pulse width can be optimized more to a precision. It is also possible to make a temperature change follow and to change pulse width continuously. A change of pulse width can be made also about the pulse of which process of addressing, burning maintenance, and preparation (initialization of a charge) of addressing.

[0008] The period assigned to impression of the pulse can be shortened by shortening pulse width. For example, if the width of face of the pulse for the line selection in addressing is shortened, time amount compaction of the shortened line count twice of each pulse width is possible about 1 time of addressing. When the maximum time delay of the address discharge in 0 degree C is 2.0 microseconds and the maximum time delay in 25 degrees C is 1.0 microseconds, specifically, a shortened part per one pulse is set to 1.0 microseconds. In PDP of the VGA specification of a line count 480, if one frame shall be divided into ten subframes and a gradation display shall be performed, the sum total of abbreviated time will be set to 4.8ms (=1.0microsecondx480x10). This value is about 28.7% of a frame period (about 16.7ms). In addition, when dividing into two or more subfields the field which constitutes a frame in the display of an interlace format, time amount compaction is possible similarly.

[0009] If shortened time amount is assigned to burning maintenance, the count of display discharge can be increased and brightness can be raised. Width of face of the pulse in burning maintenance may be lengthened, and the soundness of display discharge may be raised. If the number of subframes is increased, diversification of an illuminant cloth effective in the improvement in gradation nature and prevention of false coutour can be attained. If it assigns preparation of addressing, more positive initialization processing can be performed. Moreover, since the period which is in a half-selection condition becomes short when addressing is shortened, discharge can be prevented and an indication can be given to stability. Furthermore, also by establishing the period which stops impression of an electrical potential difference, and calming down the charge of discharge space, discharge can be prevented and an indication can be given to stability.

[0010]

[Embodiment of the Invention] [Outline of an equipment configuration and actuation] Drawing 1 R> 1 is the block diagram of the display concerning this invention. The display 100 consists of a drive unit 70 which controls PDP1 of a field discharge mold with the possible screen of the color display

which consists of a cel of a mxn individual, and luminescence of a cel, and a sensor 90 which detects panel skin temperature. The controller 71 built into the drive unit 70 changes the pulse width of the driver voltage pulse impressed to a cel according to the output of a sensor 90. In addition, impression of a pulse means carrying out bias of the electrode to predetermined potential temporarily.

[0011] In order to produce desired discharge in all cels, pulse width must be made longer than the discharge time delay in a cel with the lowest temperature. Therefore, the monitor of the temperature by the sensor 90 is performed about the part to which temperature tends to become low like a comparison of the screens. Although it is desirable to measure directly the temperature inside the cel concerning discharge properties, such as electronic ionic temperature, skin temperature of the MgO film, and temperature of a fluorescent substance, a sensor 90 may be arranged in the location distant from the cel, and temperature may be measured indirectly. It is also possible to presume the temperature of a cel based on the function of tooth-back chassis temperature, actuation circuit element temperature, the time amount from powering on, and a display load factor and time amount. Since it is dependent on the content of a display, the cel to turn on may concentrate on a part of screen, and may carry out temperature up of the temperature distribution of the screen locally. The dependability of measurement increases by measuring the temperature of two or more places.

[0012] Drawing 2 is drawing showing the electrode array of PDP. In PDP1, the display electrodes X and Y which constitute the electrode pair for producing display discharge are arranged by parallel, and the address electrode A is arranged so that these display electrodes X and Y may be intersected. The display electrodes X and Y were prolonged in the line writing direction (horizontal direction) of a matrix display, and the address electrode is prolonged in the direction of a train (perpendicular direction). In drawing, the subscript of the reference mark of the display electrodes X and Y and the address electrode A shows array ranking. The potential of the display electrodes X and Y is controlled by the X driver 74 and the Y driver 77, and the potential of the address electrode A is controlled by the A driver 80.

[0013] Drawing 3 is drawing showing the cellular structure of PDP. PDP1 consists of substrate structures (structure which prepared the component of a cel on the substrate) 10 and 20 of a couple. Each of the display electrodes X and Y arranged by the inner surface of the glass substrate 11 by the side of a front face consists of transparence electric conduction film 41 which forms a field discharging gap, and a metal membrane (bus electrode) 42 prolonged covering the overall length of a line. A dielectric layer 17 is formed so that the display electrode pair X and Y may be covered, and the magnesia (MgO) is put on the front face of a dielectric layer 17 as a protective coat 18. One address electrode A is arranged by the inner surface of the glass substrate 21 by the side of a tooth back at each one train, and two or more plane view band-like septa 29 are formed on the dielectric layer 24 which covers these address electrode A. Discharge space is divided by the line writing direction for every train by these septa 29. And the fluorescent substance layers 28R, 28G, and 28B of three colors of R, G, and B for color display are formed so that the side face of the address electrode A and a septum 29 may be covered. The italic alphabet R, G, and B in drawing shows the luminescent color of a fluorescent substance. The fluorescent substance layers 28R, 28G, and 28B are locally excited by the ultraviolet rays which discharge gas releases, and emit light by them.

[0014] Drawing 4 is the conceptual diagram of field partition. In the display of the television image by PDP1, in order for selection of the combination of burning / astigmatism LGT to perform a color rendering, the field f of the time series which is an input image is divided into the subfield sf of a predetermined number q. That is, each field f is transposed to the set of q subfields sf. They are the weight U1 of brightness, U2, U3, --Uq to order in these subfields sf. It gives and the count of display discharge of each subfield sf is set up. You may be other sequence although a subfield array is the order of weight by a diagram. To compensate for such a field configuration, the field period Tf which

is a field transfer period is divided at q subfield periods Tsf, and one subfield period Tsf is assigned to each subfield SF. Furthermore, the subfield period Tsf is divided into the display period TS for the address period TA for the reset period TR for initialization, and addressing, and burning maintenance. The die length of the display period TS is so long that weight is large to the die length of the reset period TR and the address period TA not being dependent on weight. Therefore, the die length of the subfield period Tsf is also so long that the weight of the corresponding subfield sf is large.

[0015] Drawing 5 is the electrical-potential-difference wave form chart showing the outline of an actuation sequence. The sequence of reset period TR, address period TA, and the display period TS is common in q subfields sf, and an actuation sequence is repeated for every subfield. In addition, about a wave, it is possible to change various the amplitude, polarities, and timing. Not only a write-in address format of a graphic display but elimination address format may be adopted.

[0016] In the reset period TR, the pulse Pry1 of straight polarity and the pulse Pry2 of negative polarity are impressed in order to all the display electrodes Y. The pulse Prx of negative polarity is impressed to impression and coincidence of a pulse Pry1 to all the display electrodes X, and bias of the display electrode X is carried out to the potential of straight polarity after that. The synthetic electrical potential difference adding the amplitude of the pulse impressed to the display electrodes X and Y joins a cel. A pulse Pry1 is impressed in order to make all cels produce the suitable wall voltage of the same polarity irrespective of burning / astigmatism LGT in a before subfield. By impressing a pulse Pry2 to the cel in which moderate wall charge exists, wall voltage can be adjusted to the value equivalent to the difference of breakdown voltage and pulse amplitude. The electric-field condition in all cels is made for initialization (equalization of a charge) in this example to become the same at the time of address electrical-potential-difference impression.

[0017] In the address period TA, required wall charge is formed in burning maintenance only at the cel which should be turned on. Where bias of all the display electrodes X and all the display electrodes Y is carried out to predetermined potential, the scanning pulse Py of negative polarity is impressed to one display electrode Y corresponding to a selection line at every line selection period (scan period). The address pulse Pa is impressed to the address electrode A corresponding to the selection cel which should make the line selection and coincidence by impression of the scanning pulse Py produce address discharge. In a selection cel, discharge between the display electrode Y and the address electrode A arises, it serves as a trigger and display inter-electrode field discharge arises. Discharge of these single strings is address discharge. Wall charge is formed in a dielectric layer 17 of address discharge, and wall voltage required for burning maintenance arises in display inter-electrode by it.

[0018] In the display period TS, the sustain pulse Ps1 of straight polarity is impressed by turns to the display electrode Y and the display electrode X. By the first impression to the display electrode Y, display inter-electrode field discharge arises [ a cel electrical potential difference ] exceeding breakdown voltage in a selection cel. Since the polar wall charge of before and objection is formed of field discharge, in a selection cel, field discharge arises again by impression of the sustain pulse Ps to the display electrode X. Similarly, field discharge arises in a selection cel for every impression of the sustain pulse Ps henceforth. In the display period TS, in order to prevent unnecessary discharge, bias of the address electrode A is carried out to the potential of the sustain pulse Ps and like-pole nature.

[0019] In such an actuation sequence, the pulse width of the pulse impressed since discharge is produced is changed to compensate for panel skin temperature change.

[Change of pulse width] Drawing 6 is drawing showing the 1st example of modification of an actuation wave. In the 1st example, about the pulse width of the address pulse Pa, two steps of changes are performed and the count of impression of the sustain pulse Ps is changed according to the change in the address period TA by it.

[0020] When panel skin temperature is lower than the threshold set up beforehand, it is pulse width WL. Scanning pulse PyL long in comparison And address pulse PaL It impresses. Address period TAL Die length is pulse width WL. It becomes n or more times (n is a line count). In drawing, it is the scanning pulse PyL for convenience. An impression period is pulse width WL. It is carried out.
[0021] On the other hand, when panel skin temperature is high, it is pulse width WH. Scanning pulse PyH short in comparison And address pulse PaH It impresses. Address period TAH Die length is the address period TAL when temperature is low. It compares and only deltaT [=(WL-WH) xn] is short. By assigning this compaction part deltaT to burning maintenance, it is the sustain period TSH. Sustain period TSL when temperature is low It is long. Only the part which became long can impress more sustain pulses Ps, and can raise brightness. The sustain pulse Ps which attached the slash all over drawing is an added part.
[0022] Drawing 7 is drawing showing the 2nd example of modification of an actuation wave. In the 2nd example, the die length (deltaT) of the blank period in the stage of arbitration until it performs two steps of changes and starts addressing of the next subfield from termination of burning maintenance according to the change in the address period TA by it about the pulse width of the address pulse Pa is changed. That is, the initiation stage of the sustain period TS is made adjustable, and when panel skin temperature is high, it is the address period TAH. The time amount from termination of the continuing sustain period TS to lengthen to initiation of the reset period TR of the following subframe is covered, and the display electrodes X and Y and the address electrode A are maintained at touch-down potential. However, the bias potential of each electrode can be selected in the range without fear of discharge that what is necessary is just to stop the electrical-potential-difference impression to a cel substantially. If a blank period is lengthened when panel temperature is high, it will be hard coming to generate the discharge after space charge becomes calm. Moreover, the die length of the reset period TR may be changed according to the change in the address period TA. According to this, when panel temperature is high, it becomes possible to perform more positive initialization processing.
[0023] Drawing 8 is drawing showing the 3rd example of modification of an actuation wave. In the 3rd example, two steps of changes are performed about the pulse width of the pulses Prx, Pry1, and Pry2 for initialization. When panel skin temperature is low, they are pulse width W1L and W2L. Pulse PrxL and Pry1L long in comparison, and Pry2L It impresses. When panel skin temperature is high, it is pulse width W1H and W2H. The pulse PrxH short in comparison, Pry1H, and Pry2H It impresses. And the shortened time amount by this is used effectively. That is, it assigns burning maintenance, and it carries out, and brightness is raised or discharge is prevented [ and ] the increase of the number of subfields, and by considering as a blank period. [ raising image quality ]
[0024] Drawing 9 is drawing showing the 4th example of modification of an actuation wave. In the 4th example, two steps of changes are performed about the pulse width of the sustain pulse Ps. When panel skin temperature is low, it is pulse width WsL. Sustain pulse PsL long in comparison It impresses. When panel skin temperature is high, it is pulse width WsH. The sustain pulse PsH short in comparison is impressed. Pulse width WsH Since it is short, they are many sustain pulses PsH from the time that it is low when panel skin temperature is high. It can impress and brightness can be raised. The number of subfields can be increased and image quality can also be raised. Shortened time amount can be assigned at the reset period TR, high initialization processing of soundness can be performed, and addressing and the electrical-potential-difference margin of burning maintenance can also be extended by it.
[0025] the above the 1- modification of the pulse width in each 4th example was two steps of modification which carries out an operating temperature limit bordering on a threshold Tth like drawing 10 (A) for 2 minutes, and switches pulse width by which value of the low temperature range

whose panel skin temperature is below a threshold, and the pyrosphere exceeding a threshold it is. If the thresholds Tth1 and Tth2 of two or more pieces are set up like drawing 10 (B) and a multistage story is switched, pulse width can be optimized more to a precision. Furthermore, it is also possible to make a temperature change follow like drawing 10 (C), and to change pulse width continuously. It is decided by the temperature dependence of a discharge property whether to use a flattery property as a non-line type, or consider as a line type.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] It is the block diagram of the display concerning this invention.
[Drawing 2] It is drawing showing the electrode array of PDP.
[Drawing 3] It is drawing showing the cellular structure of PDP.
[Drawing 4] It is the conceptual diagram of field partition.
[Drawing 5] It is the electrical-potential-difference wave form chart showing the outline of an actuation sequence.
[Drawing 6] It is drawing showing the 1st example of modification of an actuation wave.
[Drawing 7] It is drawing showing the 2nd example of modification of an actuation wave.
[Drawing 8] It is drawing showing the 3rd example of modification of an actuation wave.
[Drawing 9] It is drawing showing the 4th example of modification of an actuation wave.
[Drawing 10] It is drawing showing the gestalt of modification of pulse width.
[Description of Notations]
1 PDP (Plasma Display Panel)
ES Screen
Py Scanning pulse
Pa Address pulse
Ps Sustain
TA Address period
TS Display period
90 Sensor
WL, WH Pulse width
Tth, Tth1, Tth2 Threshold (laying temperature)

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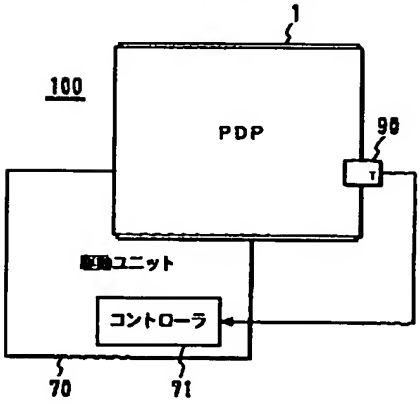
[Translation done.]

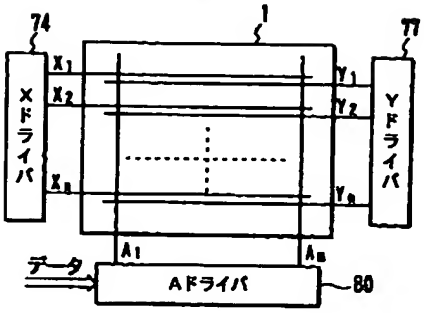
【図1】

本発明に係る表示装置の構成図



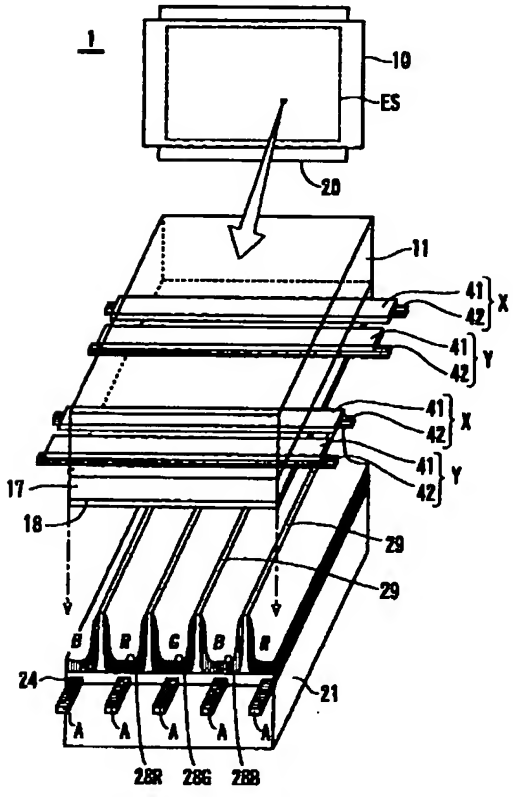

【図2】

PDPの電極配列を示す図



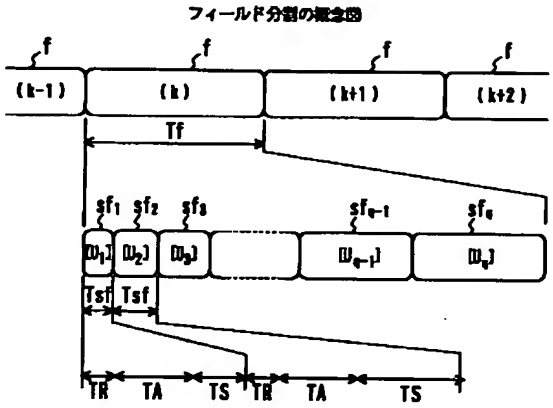

【図3】

PDPのセル構造を示す図



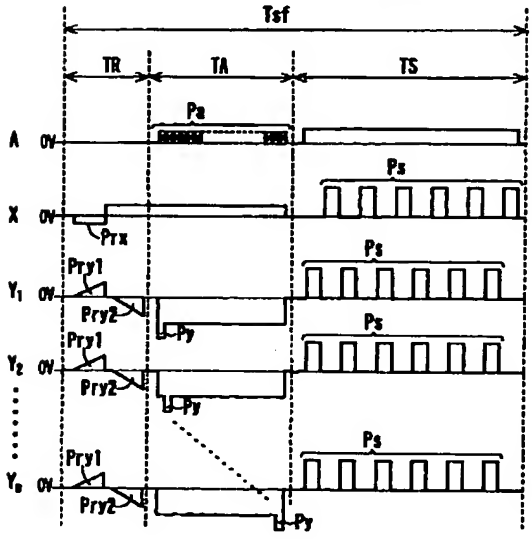

【図4】

フィールド分割の概念図

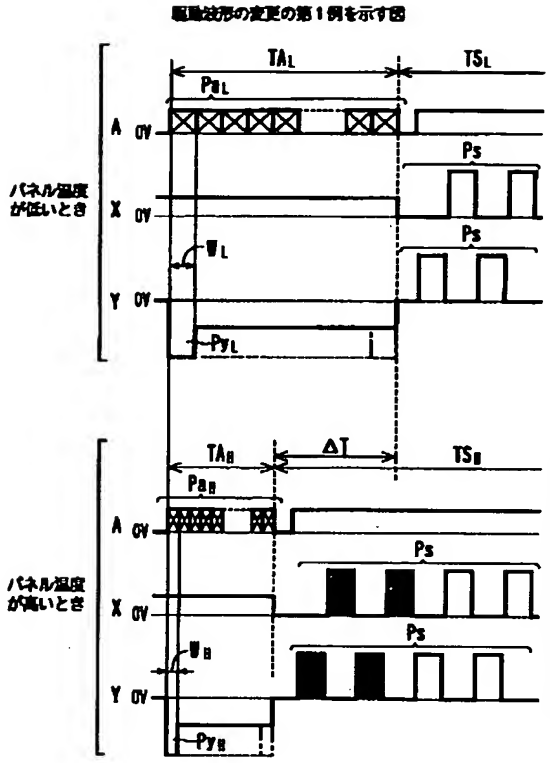



【図5】

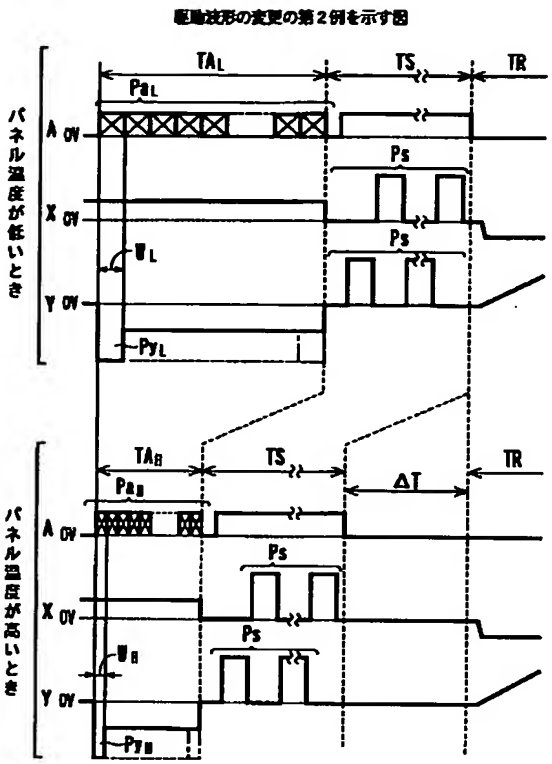
駆動シーケンスの概略を示す電圧波形図



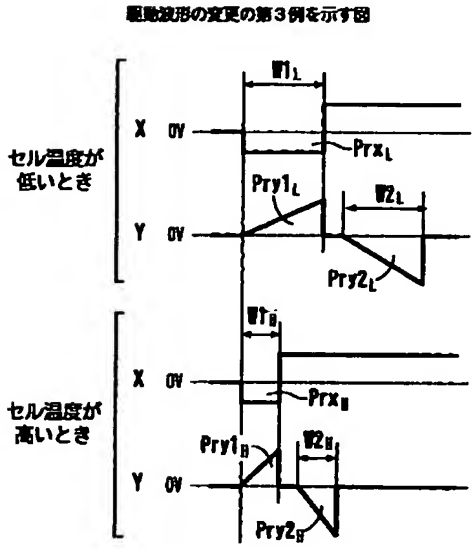
【図6】


駆動波形の変更の第1例を示す図
パネル温度が低いとき
パネル温度が高いとき
TA_L
TS_L
Pa_L
Ps
W_L
Py_L
TA_H
ΔT
TS_H
Pa_H
W_H
Py_H
A 0V
X 0V
Y 0V

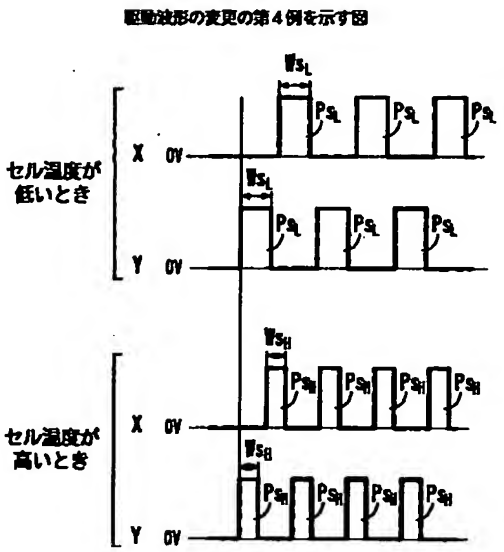
【図7】


駆動波形の変更の第2例を示す図
パネル温度が低いとき
パネル温度が高いとき
TA_L
TS
TR
Pa_L
Ps
W_L
Py_L
TA_H
ΔT
TS
TR
Pa_H
W_H
Py_H
A 0V
X 0V
Y 0V

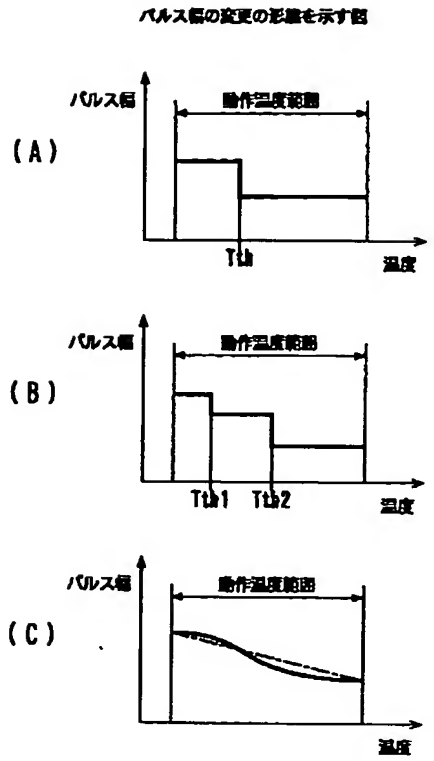
【図8】


駆動波形の変更の第3例を示す図
セル温度が低いとき
セル温度が高いとき
W1_L
Prx_L
Pry1_L
W2_L
Pry2_L
W1_H
Prx_H
Pry1_H
W2_H
Pry2_H
X 0V
Y 0V

【図9】


駆動波形の変更の第4例を示す図
セル温度が低いとき
セル温度が高いとき
Ws_L
Ps_L
Ws_H
Ps_H
X 0V
Y 0V

【図10】

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